***Figure 5-9. B-D Flow Cytometer FACSCaliber, Becton Dickenson***

### 5.1.3.2 Dry Detectors (Mass Spectrometry)

Mass spectrometry (MS) is a microanalytical technique that requires only a few nanograms of analyte to obtain characteristic information on the structure and molecular weight of the analyte. The technique ionizes molecules and breaks them apart into characteristic fragments (the fragmentation pattern constitutes its "mass spectrum"). The mass spectrometer requires that samples be introduced in the gaseous state. Sample introduction into the mass spectrometer can be by direct air/gas sampling, a direct insertion probe, membrane inlets, effluent from a gas chromatograph (GC), effluent from a high-performance liquid chromatograph (HPLC), capillary electrophoresis, and effluent from pyrolysis devices. Several examples of detection equipment utilizing mass spectrometry are discussed below.

The Pyrolysis-Gas Chromatography-Ion Mobility Spectrometer (PY-GC-IMS) combusts, or pyrolyzes, the biological particles. The biological pyrolysis products are then separated using gas chromatography. Once separated, the individual pyrolysis products are introduced into an ion mobility spectrometer for analysis. This technology is still quite new and was developed in a collaborative effort between Edgewood Chemical Biological Center (ECBC) and the University of Utah.

The Matrix-Assisted Laser Desorption Ionization-Time of Flight-Mass Spectrometry (MALDI–TOF–MS) is a variation of mass spectrometry that attempts to use a more gentle method of ionizing the suspect biological agent than pyrolysis to allow identification of the agent rather than just broad characterization.

Chemical Biological Mass Spectrometer (CBMS) uses a multistage process to analyze aerosols for biological content and categorize any biological constituents. The instrument first concentrates the aerosol, combusts or pyrolyzes it, then introduces the sample into a mass spectrometer for analysis. An on-board computer is used to analyze the mass spectra for patterns indicative of biological substances. The instrument is able to categorize biologicals as spores, cells, or toxins. Figure 5–10 shows an example of the CBMS from Bruker.

***Figure 5-10. Chemical Biological Mass Spectrometer (CBMS), Bruker***

### 5.1.4 Identifiers (Specific Identification Technologies)

Identifiers are those components/instruments that are able to identify the suspect biological agent to the species level (for cellular and viral agents) and toxin type. Specific identification technologies determine the presence of a specific biological agent by relying on the detection of a specific biomarker that is unique for that agent. Antibody-based identifiers are used for systems where speed and automation are required. Where time and manpower are available, gene-based systems start to take the lead.

The technologies that are used to specifically identify a biological agent are the most critical components of the detection architecture. These components have the widest variety of technologies and equipment available. Brief descriptions of several identifiers are included in sections 5.1.4.1 and 5.1.4.2.

#### 5.1.4.1 Immunoassay Technologies

Immunoassay technologies detect and measure the highly specific binding of antigens (substances that are foreign to the body) with their corresponding antibodies by forming an antigen-antibody complex. In an immunoassay-based biological agent identification system, the presence of an analyte (agent) is detected and identified by relying on the specificity of the antigen-antibody binding event. The immunoassays are grouped into three categories: disposable matrix devices (tickets or kits), biosensors that use tag reagents to indirectly measure binding, and biosensors that do not require a tag (direct affinity assays). Each of these categories, along with examples of the corresponding technologies, is discussed below.

***Disposable matrix devices***: Disposable matrix devices are often referred to as tickets or kits. They usually involve dry reagents, which are reconstituted when a sample is added. There are one-step assay formats, as well as more complex formats involving multiple steps that are performed using one or more reagents. Ticket assays can be automated using instrumentation to perform the manual assay steps and provide a semiquantitative test readout. Rapid handheld

assays with greater sensitivity, specificity, and reproducibility are under development for a wide range of bacterial agents and toxins. These assays have excellent stability characteristics, and test results are easy to obtain.

Typical ticket-based technologies include the Hand-Held Immunochromatographic Assays (HHAs), BTA™ Test Strips, and the Sensitive Membrane Antigen Rapid Test (SMART) system.

Hand-Held Immunochromatographic Assays (HHAs) are simple, one-time-use devices that are very similar to the urine test strips used in home pregnancy tests. There are currently 10 live agent assays in production, four simulants, and five trainers (only saline solution is needed to get positive results). These tests provide a yes/no response; however, a skilled observer can tell how much agent is present (semiquantitative measurement) by the degree of color change. HHAs are currently being used in virtually all fielded military biological detection systems, are in developmental systems, and are being used by a number of consequence management units. Their utility is due in large measure to their adaptability to automated readers as well as manual readers. Power is not required to use HHAs manually.

BTA™ Test Strips are detection strips that are manufactured by Tetracore LLC and distributed by Alexeter Technologies, LLC. The chemistry technique (lateral flow Immunochromatography) uses monoclonal antibodies that are specifically attracted to the target substance. When the level of the target substance is present in the sample above a certain concentration, the antibodies and target substance combine in the BTA™ Test Strip to form a reddish band that appears in a window. The test is positive if two colored lines appear. If only one colored line appears in the "C" Window, the test is negative. This technique provides fewer false positives in environmentally collected samples. Anthrax and ricin assays are available, with other assays in development. Figure 5–11 shows the Tetracore BTA™ Test Strip testing procedure.

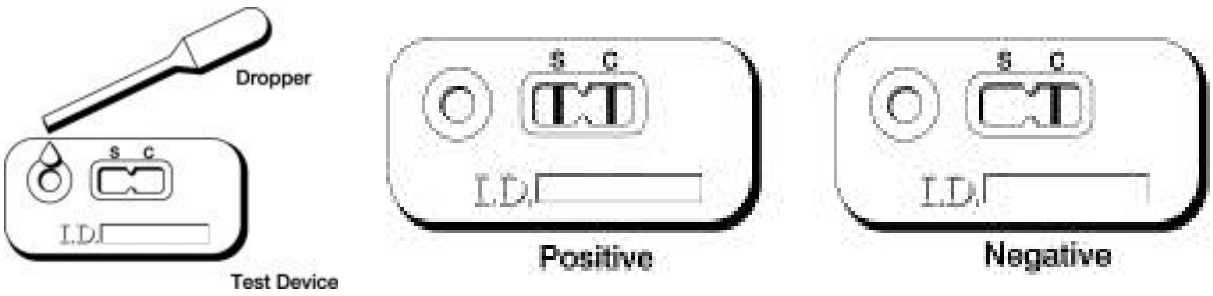


***Figure 5-11. BTA™ Test Strip testing procedure, Tetracore, LCC***

Sensitive Membrane Antigen Rapid Test (SMART) is a ticket-based system for detecting and identifying multiple analytes. The core chemistry approach detects antigens in the sample by immunofocusing colloidal gold-labeled reagents (leveled antibodies) and their corresponding antigens onto small membranes. Positive results (formation of a red dot) are detected by an instrument that measures the membrane reflectance. An automated ticket-based system can be used to perform the SMART immunoassays. Figure 5–12 shows an example of the NDI Smart Ticket, manufactured by New Horizons Diagnostics Corporation in Columbia, MD.

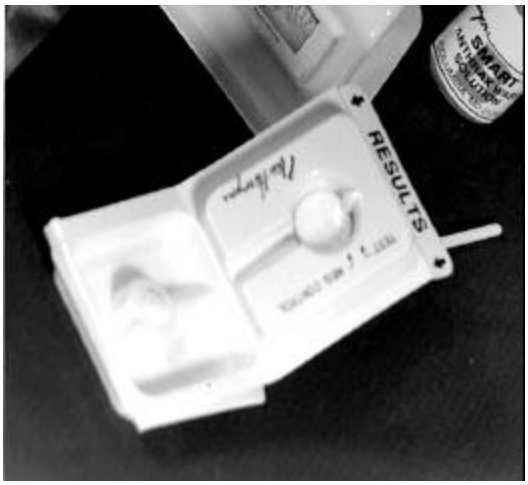


***Figure 5-12. NDI Smart Ticket***

***Reagent Tag Biosensor Approaches:*** In this approach, biosensors integrate the sensing element (optical or electronic) with the biological coating to provide for a rapid, simple bio-analysis. In contrast with tickets, biosensors for biological agent detection consist of a sensing element, often enclosed in a flow cell, and an associated instrument for quantitative readout. A fluidics system is required to provide an automated, multi-analyte immunoassay to introduce the sample and one or more reagents into the sensor/flow cell during a test sequence. Biosensor-based assays are designed to be automated and often have an inherent capability for multi-analyte detection.

Reagent tag biosensor methods include fluorescent evanescent wave biosensor surface, electrochemiluminescence, Light Addressable Potentiometric Sensor (LAPS) Immunoassay, and latex particle agglutination/light scattering.

An example of fluorescent evanescent wave biosensor technology is the Fiber Optic Wave-Guide (FOWG). The FOWG uses antibody-coated fiber optic probes and a fluorescent "reporter" antibody to determine the presence of a suspect agent. If an agent is present in the aqueous solution circulating through the instrument, it will bind to the antibody on the probe. The instrument then circulates a second solution containing a fluorescent labeled antibody, which will also bind to the agent. The device then looks for the presence of the fluorescent tag on one of the probes.

***No-Tag Reagent Biosensor Methods***: Antigen-antibody binding is detected directly in no-tag reagent biosensor methods (i.e., direct affinity or homogeneous assays). Advantages to this type of assay include simplification of the analysis process (fewer steps, fewer components), minimized disposable fluid use (no need to carry tag reagent solutions), reuse of sensors after a negative test (minimal disposable use), and a smaller, lighter-weight instrument that consumes less power.

Examples of no-tag biosensor methods include interferometry, surface plasmon resonance, piezo-electric crystal microbalance, waveguide coupler, and electrical capacitance. The example of direct affinity no-tag biodetection technology is discussed in the following text. A device that

uses no-tag reagent biosensor technology is Bi-Diffractive Grating Coupler (BDG), an optical transducer that is being developed by Battelle Memorial Institute and Hoffman-LaRoche. This device takes advantage of a phenomenon linked with one of the two components of a polarized light wave. Polarized light is divided into a transverse electric (TE) and transverse magnetic (TM) mode. The TM mode has an evanescent "tail" that moves with the light wave and above the medium (in this case, a plastic wave-guide that is coated with antibodies specific for a particular agent). The binding events change the index of refraction of the wave-guide surface layer, which alters the velocity of light traveling in the wave-guide through its evanescent field interaction. The optical property measured by this device, using optical interferometry, is the change in refractive index on the binding of the target molecule with the surface.

#### 5.1.4.2 Nucleic Acid Amplification

Nucleic acid amplification may be used to help detect the presence of DNA or RNA of bacterial and viral biological agents (nucleic acid amplification cannot directly detect the presence of the toxins themselves). Samples for nucleic acid analysis can be obtained from field samples, from laboratory cultures, or from tissues of infected animals or humans. Polymerase chain reaction (PCR) is the most widely used method to amplify small quantities of DNA for analysis. Two examples of nucleic acid amplification are included in the following text.

The Mini–PCR (Ten Chamber PCR) is an instrument that has been developed by Lawrence Livermore National Laboratory (LLNL) and represents one of the first attempts to get gene-based identification technologies in a field-useable format. This device relies on a process called polymerase chain reaction (PCR) and a commercial chemistry called Taq-man®. A suspect sample is placed into a miniature thermal cycler that heats up and cools off very quickly and has miniature optics built into it; there are 10 of these mini-thermal cyclers in the 10 chamber device. In short, the instrument makes many copies of a particular gene segment of the suspect agent (if the agent is present), and as more copies are made, the more fluorescent light is generated by the Taq-man® process. The instrument is able to read the increase in light in near real time. This technology promises to be very sensitive and very specific.

The LightCycler™, developed by Idaho Technology, is a thermal cycler that uses a unique built-in fluorimetric detection system with specially developed fluorescent dyes, as well as Taq-man® technology, for on-line quantitation and amplification products. It is being manufactured under license by Roche Diagnostics. Figure 5–13 presents a picture of the LightCycler™.

The Ruggedized Advanced Pathogen Identification Device (RAPID), from Idaho Technology, is a rugged, portable field instrument that integrates the LightCycler™ technology. The RAPID can run a reaction and automatically analyze the results in less than 30 min. Special software allows push button use of the RAPID, allowing for quick, safe, and accurate field identification of possibly dangerous pathogens. It is currently available for military field hospitals and law enforcement use. See Figure 5–14 for a picture of the RAPID.

*Figure 5-13. Rapid LightCycler®, Idaho Technology*

*Figure 5-14. RAPID, Idaho Technology*

## 5.2 Standoff Technologies

Standoff systems are designed to detect and identify biological agents at a distance away from the aerosol/plume or from the detector system, before the agents reach the location of the system. Standoff systems do not utilize a trigger/cue, collector, or detector but use a bright light source such as a laser for detection of the biological agents.

Standoff technology uses the concept of detecting and measuring atmospheric properties by laser remote sensing or LIDAR, an acronym for light detection and ranging. In LIDAR, a short laser pulse is transmitted through the atmosphere, then a portion of that radiation is reflected back from a distant target or from atmospheric particles such as molecules, aerosols, clouds, or dust. All of these systems must be line-of-sight to the suspect biological agent event. Because LIDAR systems use light, which is composed of short wavelength energy, they are able to "see" the small aerosol particles characteristic of biological agent attacks (predominantly less than 20 µm in diameter). IR based LIDAR systems are able to see out to ranges of 30 km to 50 km as the atmosphere is fairly transparent to this wavelength of light. One limiting factor to standoff systems is the lack of availability of small, inexpensive high-power lasers. Several standoff instruments are identified below.

IR LIDARs cannot discriminate between biological and nonbiological aerosols; therefore, the remote detection of biological agents is best accomplished using a UV laser and the laser-induced fluorescence (LIF) technique. This results in an illuminated biological aerosol with a strong UV laser pulse that causes the biological agent to fluoresce. The fluorescence is red-shifted from the UV excitation frequency and detected in a longer wavelength UV band. The LIF system is more effective during low light or nighttime operations; the range is severely curtailed by the relative opacity of air to UV light and the high UV background during daylight hours.

Compact LIDAR is a system that has been in development at Soldier Biological and Chemical Command (SBCCOM) and Edgewood Chemical and Biological Center (ECBC) since 1996. The goal of the program is to develop a lightweight, ground-based standoff detection system that can track, calculate relative concentrations, and map potential biological aerosols. The system uses an IR laser system and cannot discriminate between biological and nonbiological aerosols.

Hybrid LIDAR is a system under development by the Electro Optics Organization Inc. (EOO) and Stanford Research Institute (SRI), under the sponsorship of the Defense Advanced Research Projects Agency (DARPA). The goal of this project is to develop a system that can be mounted on an unmanned aerial vehicle (UAV). The concept is that the UAV will loiter in an area, scanning for suspicious aerosols with its IR LIDAR component. When a suspect cloud is spotted, the UAV will move in close and interrogate the cloud for biological content using its ultraviolet (UV) component.

MIRELA is an IR LIDAR that is being collaboratively developed by SBCCOM and France. The system was originally developed for standoff detection of chemical clouds but is now being evaluated for bio-aerosol detection. This system cannot discriminate between biological and nonbiological aerosols.

MPL 1000 and MPL 2000 are commercially available IR LIDAR systems (manufactured by Science and Engineering Services, Inc.-SESI) originally developed in collaboration with NASA-Goddard Space Flight Center for monitoring atmospheric cloud and aerosol structures. NASA and DOE now have over a dozen MPL instruments in routine use at research sites. These instruments cannot discriminate between biological and nonbiological aerosols.

Of the standoff detection systems discussed, the MPL 1000 is the closest to being a fieldable standoff detection system. The system is already in production and is fairly lightweight and rugged. This system, as is true with all the systems, requires additional time to develop its detection algorithm. All of the standoff detection systems described require manual interpretation of raw data.

The Long-Range Biological Standoff Detection System (LR-BSDS) can detect aerosol clouds up to 30 km from the detector from an airborne platform, specifically a helicopter. This system uses pulsed laser beams in the near-IR regime of the optical spectrum (1 μm) to detect these clouds. However, since only aerosol clouds are detected, there is no biological discrimination to distinguish these clouds from other clouds, such as dust clouds. See Figure 5–15 for an example of a long-range detector system.

***Figure 5-15. Long-Range Biological Standoff Detection System (LIDARS)***

## 5.3 Passive Standoff Technologies

Passive standoff detection systems rely on the background electromagnetic energy present in the environment for detection of biological agents. Typically, these systems look at the mid-IR (3 μ to 5 μ) or far-IR (8 μ to 12 μ) region of the spectrum for agent signatures. Currently researchers are investigating the utility of IR spectroscopy for detection and identification of biological agents. While bio-aerosols have been visualized by IR systems immediately after dissemination, they quickly loose that signature and become invisible to current passive systems. Systems such as the M21 Remote Sensing Chemical Agent Alarm (RSCAAL) and Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) have been used in attempts to detect biological agents with little success.

# 6. HOW TO PREPARE FOR A BIOLOGICAL INCIDENT

This section provides emergency first responders and other interested organizations with information on what actions an emergency first responder should take in the case of a biological incident. It has information on Federal and State programs for support, crisis management, and functional tasks during a terrorist attack.

## 6.1 Federal and State Programs for Support

As outlined in previous sections of this guide, biological detection equipment is mainly in the developmental phase. Because of this, there is a limited number of commercially available instruments; what is available is costly and has limited utility. Without equipment to detect and identify a biological agent, emergency first responders must turn to existing State and Federal organizations for support.

A number of State and Federal agencies are working throughout the country to set up standards for operations during a terrorist attack involving biological, chemical, or nuclear weapons of mass destruction. The Centers for Disease Control and Prevention (CDC) is coordinating a nationwide program called the National Laboratory System (NLS) to provide communication, coordination, and testing capacity required to effectively detect and report disease outbreaks and exposures (see app. B, ref. 1). The goal of the NLS is to integrate the reporting and response of disease outbreaks and/or terrorist bioweapon attacks. The system will integrate Federal, State, and local public health laboratories, as well as hospital, independent, and physicians' laboratories, for monitoring the population for an outbreak of disease. Through the NLS, the CDC provides private and State public health laboratories with information, analytical methods, and analytical reagents for analysis of biological agents. The CDC also sponsors the Laboratory Response Network (LRN) through the Association of Public Health Laboratories (see app. B, ref. 2). The LRN is focused on educating laboratories on the methods needed to test for biological agents.

The emergency first responder must recognize that while public health laboratories and supporting clinical laboratories have the capability to detect and identify possible biological agents, these tests are not field deployable. The detection methods used are laboratory-based systems and should not be confused with field-based systems described in earlier portions of this guide. Generally, the laboratory-based systems are slower than field systems, but the laboratory-based systems exhibit greater selectivity and versatility than field-based systems. It should also be recognized that different laboratories have different capabilities.

The CDC uses a four-level categorization of laboratory responsibilities for detection and identification of a biological agent. The laboratories are categorized as Level A, Level B, Level C, and Level D laboratories.

- Level A laboratories focus on early detection of intentional dissemination of biological agents. They are mostly composed of microbiology laboratories that conduct primary clinical testing, such as hospital and independent laboratories. Level A laboratories are

responsible for ruling out the presence of pathogenic organisms and forwarding suspicious and potentially dangerous organisms to laboratories capable of identifying the organisms.
- Level B laboratories focus on testing for specific agents and forwarding organisms or specimens to higher level biocontaminant laboratories.
- Level C laboratories focus on advanced and specialized testing for rapid identification of biological agents.
- Level D laboratories focus on diagnosis of rare and dangerous biological agents.

First responders will generally only have to deal with Level A laboratories.

### 6.2 Crisis Management in a Terrorist Attack

Crisis management must be integrated and managed under an overall unified command structure during a terrorist attack (see app. B, ref. 3). Crisis management for a terrorist attack using biological agents consists of public health monitoring, surveillance, detection, and reporting the use of a biological weapon of mass destruction (WMD).

Emergency first responders (fire and rescue) will be involved in the early stages of crisis management, primarily the reporting of the possible use of a biological weapon. For this reason, emergency first responders need to have an emergency response plan in place for any possible biological (as well as chemical and radiological) incident. Therefore, it is strongly recommended that emergency first responders plan their response to a biological (as well as chemical and radiological) incident well in advance.

A recent report in the State of Maryland entitled "Maryland Health and Medical System Preparedness and Response Plan—Weapons of Mass Destruction, Work Plan," suggests that the response to an incident be coordinated through local, State, and Federal channels to ensure complete integration of the local response to any such incident (see app. B, ref. 3). The State of Maryland recommends coordination with the State police, the State public health department/laboratories, and the Federal Bureau of Investigation (FBI). It is stressed that these are the recommendations of the State of Maryland; recommendations may be different for each State. Therefore, it is essential that the first responder contact local and State officials in order to coordinate a response to a biological agent incident.

### 6.3 Functional Tasks During a Terrorist Attack

In the event of a terrorist attack using biological agents, each supporting agency has different functional tasks that must be carried out. Local fire and rescue service's functional tasks state that, "The Fire Chief, or first ranking officer on the scene, will be the initial incident commander for single point source incidents and must make initial determinations on tactical responses and additional support …." (see app. B, ref. 3). Local officials must plan ahead for this contingency by providing senior officers of the fire and police departments with education and training on the identification of biological (and chemical or nuclear) incident.

Once it is determined that the event is a result of a release of a biological agent (either by a terrorist or accidental), the appropriate authorities must be contacted. In the State of Maryland, first responders should contact the Maryland State Police who are to "assist with early detection

and monitoring activities by notifying the Department of Health and Mental Hygiene and the Local Health Officer of threats, credible threats, impending events, or actual terrorist acts that may produce casualties" (see app. B, ref. 3). Each first responder unit must first determine the response chain for their particular State. In this way, the first responder is integrated into the overall response to a biological (and chemical or nuclear) incident.

# 7. SUMMARY

*An Introduction to Biological Agent Detection Equipment for Emergency First Responders* was developed to provide information to the emergency first responder community and aid their understanding of biological agent detection equipment. Information included in the guide focuses on biological agents, challenges of detection, components of detection, and the basic technologies that have been or are being considered in the research and development (R&D) of biological agent detection equipment.

The guide identifies a number of biological agent detection technologies and some equipment associated with the technologies.[5] It is important to note that the equipment referenced is not all inclusive with what is currently available or currently being tested. While some equipment is commercially available, most is not (a notable exception is Tetracore test strips for biological agents).[6] It is also important to realize that biological detection equipment is limited with respect to biological agents detected as well as operational conditions. Because of this, *An Introduction to Biological Agent Detection Equipment for Emergency First Responders* was written to serve the first responder community as a guide to the status of biological agent detection.

Because commercially available biological agent detection equipment prices range from tens to hundreds of thousands of dollars, it is obvious that R&D efforts will have to continue.[7] These efforts will focus on lowering equipment costs while improving equipment sensitivity and selectivity. As new equipment and technologies emerge, and more importantly for the first responders, as equipment becomes commercially available, this guide will be updated.

Because of the lack of affordable detection equipment for biological agents, first responders must integrate their response into the overall national effort. This national effort is being developed by the CDC as well as the FBI and includes the development of analytical assets at State health laboratories for detecting biological agents. The link from the first responders to the national response effort is most likely the State police and the State public health laboratories. However, this plan is based on the State of Maryland plan and may be different for each State. Therefore, in developing a response plan for biological weapons, it is recommended that first responders contact their State police to determine if a standard operating procedure (SOP) for a terrorist attack using biological, chemical, or nuclear WMD exists. It is also suggested that prior to an event involving a biological WMD, first responders contact the nearest public health laboratory to determine points of contact. Appendix B lists the phone numbers for public health laboratories in most States, as well as the Association of Public Health Laboratories (a nonprofit association working to actively promote the interest of public health laboratories), and internet addresses for the Association of Public Health Laboratories, CDC, and State Public Health Laboratory home pages (see app. B, ref. 2, 4, and 5).

[5]It is critical to understand that reference to these technologies and equipment by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendations, or favoring by the United States Government.

[6]For example, immunoassay tickets are relatively inexpensive; however, the antibodies that are required for identification of the biological agents are not commercially available.

# APPENDIX A—REFERENCES

# APPENDIX A—REFERENCES


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2. *Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response to Chemical and Biological Terrorism Incidents*, National Academy of Sciences, 1999. National Academy Press, 2101 Constitution Avenue, N.W., Box 285, Washington, DC 20055.

3. John A. Barrett, Gregory W. Bowen, Scott M. Golly, Christopher Hawley, William M. Jackson, Leo Laughlin, Megan E. Lynch, *Final Report on the Assessment of Biological Agent Detection Equipment for Emergency Responders*, U.S. Army Chemical and Biological Defense Command (CBDCOM), June 1, 1998. CBIAC, P.O. Box 196, Gunpowder, MD 21010-0196.

4. *Assessment of Biological Warfare Detection (CD)* Joint Program Office for Bio-Defense, Skyline #2, 5203 Leesburg Pike, Suite 1609, Falls Church, VA 22041-3203, September 13, 1999.

5. *State of the Art Report on Biodetection Technologies*, July 1995. CBIAC, P.O. Box 196, Gunpowder, MD 21010-0196.

6. B. Newman, "*Opening the Case of the Poison Umbrella*," The Wall Street Journal, May 24, 1991. E-mail address: http://chiron.valdosta.edu/rgoddard/biol4900/corbett/corbett.htm .

# APPENDIX B—CONTACT INFORMATION FOR FIRST RESPONDERS

## Telephone Numbers for State Public Health Laboratories

| | |
|---|---|
| Association of Public Health Labs | 202–822–5227 |
| Alaska | 907–269–7942 |
| Arizona | 602–542–1194 |
| California | 510–540–2408 |
| Colorado | 303–692–3289 |
| Connecticut | 860–509–8540 |
| Florida | 850–245–4401<br>e-mail Bill Dart (Bill_Dart@doh.state.fl.us) |
| Georgia | 404–327–7900 |
| Idaho | 208-334–5939 |
| Illinois | 217–782–4977 |
| Indiana | 317–233–8006 |
| Kansas | 785–296–1620 |
| Louisiana | 504–568–5375 |
| Maine | 207–287–2727 |
| Massachusetts | 617–983–6200 |
| Michigan | 517–335–8063 |
| Minnesota | 651–215–5800 |
| Missouri | 573–751–0633 |
| Nebraska | 402–552–3350 |
| New Jersey | 609–292–0430 |
| New Mexico | 505–841–2500 |
| New York | 716–898–6100 |
| North Carolina | 919–733–7834 |
| Ohio | 888–634–5227 |
| Oklahoma | 405–271–5070 |
| Oregon | 503–229–5882 |
| South Dakota | 800–738–2301 |
| Tennessee | 615–262–6300 |
| Texas | 512–458–7228<br>512–458–7676 |
| Utah | 801–538–6128 |
| Vermont | 802–863–7240<br>800–640–4374 |
| Virginia | 804–786–7905 |
| Washington | 206–361–2800 |
| West Virginia | 304–558–3530 |
| Wisconsin | 888–494–4324 |
| Wyoming | 307–777–7431 |

**Suggested Websites and Addresses for More Complete Information**

1. National Laboratory System (NLS) Division of Laboratory Systems (DLS): http://www.phppo.cdc.gov/mlp/nls.asp .
2. Association of Public Health Laboratories: http://www.aphl.org/ .
3. Maryland Health and Medical System Preparedness and Response Plan—Weapons of Mass Destruction, Work Plan, James R. Stanton, Maryland Institute for Emergency Medical Services Systems (410-706-0415), May 2000.
4. Center for Disease Control: http://www.cdc.gov/ .
5. Public Health Laboratory listings: http://www.phppo.cdc.gov/DLS/links/links_phl.asp .

# ABOUT THE LAW ENFORCEMENT AND CORRECTIONS STANDARDS AND TESTING PROGRAM

The Law Enforcement and Corrections Standards and Testing Program is sponsored by the Office of Science and Technology of the National Institute of Justice (NIJ), U.S. Department of Justice. The program responds to the mandate of the Justice System Improvement Act of 1979, directed NIJ to encourage research and development to improve the criminal justice system and to disseminate the results to Federal, State, and local agencies.

The Law Enforcement and Corrections Standards and Testing Program is an applied research effort that determines the technological needs of justice system agencies, sets minimum performance standards for specific devices, tests commercially available equipment against those standards, and disseminates the standards and the test results to criminal justice agencies nationally and internationally.

The program operates through:

The *Law Enforcement and Corrections Technology Advisory Council* (LECTAC), consisting of nationally recognized criminal justice practitioners from Federal, State, and local agencies, which assesses technological needs and sets priorities for research programs and items to be evaluated and tested.

The *Office of Law Enforcement Standards* (OLES) at the National Institute of Standards and Technology, which develops voluntary national performance standards for compliance testing to ensure that individual items of equipment are suitable for use by criminal justice agencies. The standards are based upon laboratory testing and evaluation of representative samples of each item of equipment to determine the key attributes, develop test methods, and establish minimum performance requirements for each essential attribute. In addition to the highly technical standards, OLES also produces technical reports and user guidelines that explain in nontechnical terms the capabilities of available equipment.

The *National Law Enforcement and Corrections Technology Center* (NLECTC), operated by a grantee, which supervises a national compliance testing program conducted by independent laboratories. The standards developed by OLES serve as performance benchmarks against which commercial equipment is measured. The facilities, personnel, and testing capabilities of the independent laboratories are evaluated by OLES prior to testing each item of equipment, and OLES helps the NLECTC staff review and analyze data. Test results are published in Equipment Performance Reports designed to help justice system procurement officials make informed purchasing decisions.

Publications are available at no charge through the National Law Enforcement and Corrections Technology Center. Some documents are also available online through the Internet/World Wide Web. To request a document or additional information, call 800–248–2742 or 301–519–5060, or write:

National Law Enforcement and Corrections Technology Center
P.O. Box 1160
Rockville, MD 20849–1160
E-Mail: *asknlectc@nlectc.org*
World Wide Web address: *http://www.nlectc.org*



The National Institute of Justice is a component of the Office of Justice Programs, which also includes the Bureau of Justice Assistance, the Bureau of Justice Statistics, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime.